

# PATENT COOPERATION TREATY



From the INTERNATIONAL SEARCHING AUTHORITY

## PCT

INVITATION TO PAY ADDITIONAL FEES

(PCT Article 17(3)(a) and Rule 40.1)

To:

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Date of mailing  
(day/month/year) 22/12/2003

Applicant's or agent's file reference  
CFO17473WO

**PAYMENT DUE**  
within 45 ~~days~~ days/days  
from the above date of mailing

International application No.  
PCT/JP 03/10215

International filing date  
(day/month/year) 11/08/2003

Applicant

CANON KABUSHIKI KAISHA

1. This International Searching Authority

- (i) considers that there are 3 (number of) inventions claimed in the international application covered by the claims indicated ~~below~~ on the extra sheet:

and it considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated ~~below~~ on the extra sheet:

- (ii) ☒ has carried out a partial international search (see Annex) ☐ will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

1 - 6, 17

- (iii) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid

2. The applicant is hereby **invited**, within the time limit indicated above, to pay the amount indicated below:

EUR 945,00 x 2 = EUR 1.890,00  
Fee per additional invention number of additional inventions total amount of additional fees

Or, \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest**, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive.

3. ☐ Claim(s) Nos. \_\_\_\_\_ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority



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*[Signature]*  
PP

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-6, 17

This invention is directed to a method of producing a (porous) mesostructured film on a substrate by applying a reaction solution comprising an amphiphilic material which can be ordered in a certain orientation on the substrate and act as surfactant template for the growth of the mesostructured film (which preferably comprises tubular, oriented mesopores), wherein, as special technical feature, the method involves holding the solution-coated substrate in a vapour atmosphere (in a controlled fashion) allowing for the amphiphilic material to aggregate in a predetermined direction

2. Claims: 7-12, 14, 15

This invention is directed to a porous mesostructured film comprising tube-shaped pores on a suitable substrate (e.g. a Si monocrystal) containing a metal oxide in pore wall of the porous film (the porous film not necessarily having been produced by a method according to claims 1-6 or 17, yet possibly accommodating an aggregate of an amphiphilic material with the pores), wherein as special technical feature(s) are identified specific structural or material properties of the film embracing its nature ( $\text{SnO}_2$ ) and/or degree of orientation of the tube-shaped pores ( $-40^\circ$  to  $+40^\circ$ ).

3. Claims: 13, 16

This invention is directed to a porous mesostructured film comprising tube-shaped pores on a suitable substrate (e.g. a Si monocrystal) containing a metal oxide in the pore walls of the porous film (the porous film not necessarily having been produced by a method according to claims 1-6 or 17, yet requiring the pre-formation of aggregates of an amphiphilic material on the substrate), wherein the special technical feature is considered to reside in the specific pre-treatment of the substrate by applying a polymer or a Langmuir-Blodgett film thereupon (as an alternative to the use of a monocrystal, cf. Invention 2) so as to promote orientational organisation of the amphiphilic material used as template material for growing the porous mesostructured film.

1. Prior art document US-B-6,387,453 describes a method of preparing mesostructured, mesoporous coatings on a preselected substrate, viz. a silicon single crystal by first applying on the substrate a film of a precursor solution comprising a material adapted to give rise to a surfactant template on which a mesoporous layer can be grown. The use of amphiphilic surfactants such as CTAB is invoked. The formation of a liquid crystal thin film of said template material by self-organisation

is achieved by controlled solvent evaporation of the precursor solution comprising the surfactant and a hydrolysable component for growing the mesoporous layer, e.g. TEOS. In this way a desirable, controllable, narrow distribution of mesopores of about 1 to 10 nm, e.g. 2.5 nm within a thin oxide layer may be obtained (cf. col. 3, l. 8 to col. 5, l. 37 and Examples 1-7). The teaching of document US-B-6,387,453 does therefore impair inventive step for the subject-matter of method claim 1 of the present application and is also considered to be novelty destroying. The teaching of document US-B-6,387,453 enables furthermore the person skilled in the art to manufacture ordered (i.e. exhibiting a certain preferred structural orientation) porous oxide coatings. Based on the generally recognised prior art knowledge, that in template synthesis of a metal oxide (the term metal is generally accepted to embrace semi-metals, such as Si), the oxide precursor material is also organised by following the pattern of the ordered surfactant-templates, it is plausible, that tubular pores of an oxide layer could be grown on ordered liquid crystals such as the ones depicted in Figs. 1a and 2a of US-B-6,387,453, as demonstrated by the directional properties of silver microwires formed within such pores; cf Fig. 7 of US-B-6,387,453. Hence, lack of unity a posteriori arises. The following groups of inventions do not share the same or a corresponding special technical feature:

2. Invention 1 (claims 1-6, 17)

This invention is directed to a method of producing a (porous) mesostructured film on a substrate by applying a reaction solution comprising an amphiphilic material which can be ordered in a certain orientation on the substrate and act as surfactant template for the growth of the mesostructured film (which preferably comprises tubular, oriented mesopores), wherein, as special technical feature, the method involves holding the solution-coated substrate in a vapour atmosphere (in a controlled fashion) allowing for the amphiphilic material to aggregate in a predetermined direction.

3. Invention 2 (claims 7-12,14,15)

This invention is directed to a porous mesostructured film comprising tube-shaped pores on a suitable substrate (e.g. a Si monocrystal) containing a metal oxide in pore wall of the porous film (the porous film not necessarily having been produced by a method according to claims 1-6 or 17, yet possibly accommodating an aggregate of an amphiphilic material with the pores), wherein as special technical feature(s) are identified specific structural or material properties of the film embracing its nature ( $\text{SnO}_2$ ) and/or degree of orientation of the tube-shaped pores ( $-40^\circ$  to  $+40^\circ$ ).

4. Invention 3 (claims 13, 15)

This invention is directed to a porous mesostructured film comprising tube-shaped pores on a suitable substrate (e.g. a Si monocrystal) containing a metal oxide in the pore walls of the porous film (the porous film not necessarily having been produced by a method according to claims 1-6 or 17, yet requiring the pre-formation of aggregates of an amphiphilic material on the substrate), wherein the

- special technical feature is considered to reside in the specific pre-treatment of the substrate by applying a polymer or a Langmuir-Blodgett film thereupon (as an alternative to the use of a monocrystal, cf. Invention 2) so as to promote orientational organisation of the amphiphilic material used as template material for growing the porous mesostructured film.

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:

**1-6, 17**

2. This communication is not the international search report which will be established according to Article 18 and Rule 43.

3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.

4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 387 453 B1 (BRINKER C JEFFREY ET AL) 14 May 2002 (2002-05-14)	1,4-6,17
Y	column 1, line 11 -column 2, line 29 column 3, line 2 -column 5, line 37; figures 1,2,7	2,3
Y	--- US 6 251 280 B1 (DAI SHENG ET AL) 26 June 2001 (2001-06-26) column 1, line 31-42 column 3, line 57-62 column 4, line 55 -column 6, line 7	2,3
X	--- US 2002/034626 A1 (BIRNBAUM JEROME C ET AL) 21 March 2002 (2002-03-21) page 2, paragraph 22 -page 3, paragraph 26 examples 1,2 page 4, paragraph 48	1
X	--- PATENT ABSTRACTS OF JAPAN vol. 2000, no. 26, 1 July 2002 (2002-07-01) & JP 2001 261326 A (ASAHI KASEI CORP), 26 September 2001 (2001-09-26) abstract figures 1-3	1,4
A	--- W0 99 47570 A (UNIV ROCHESTER) 23 September 1999 (1999-09-23) page 20, line 23 -page 23, line 30; example 6	1,4,5
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☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

# Patent Family Annex

Information on patent family members

International Application No

PCT/JP 03/10215

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6387453	B1	14-05-2002	NONE
US 6251280	B1	26-06-2001	NONE
US 2002034626	A1	21-03-2002	US 6329017 B1 11-12-2001
		AU 2379900 A 31-07-2000	
		CN 1335820 T 13-02-2002	
		EP 1144310 A1 17-10-2001	
		JP 2003520745 T 08-07-2003	
		WO 0039028 A1 06-07-2000	
		US 6548113 B1 15-04-2003	
JP 2001261326	A	26-09-2001	NONE
WO 9947570	A	23-09-1999	AU 742976 B2 17-01-2002
		AU 3191399 A 11-10-1999	
		CA 2324140 A1 23-09-1999	
		EP 1064310 A1 03-01-2001	
		WO 9947570 A1 23-09-1999	